An improved process for the preparation of higher aliphatic alcohols

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Inventor(s):
Applicant(s):: BELGE PRODUITS CHIMIQUES SA
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Abstract

Higher fatty alcohols are obtained by a continuous process from fatty materials, which include vegetable and animal oils and fats, by first catalytically treating the materials under superatmospheric pressure and elevated temperature with an excess of a monohydroxy aliphatic alcohol so that the fatty materials are converted to glycerin and alkyl esters of the acids present in the fatty materials; the esters are then catalytically hydrogenated to higher fatty alcohols, the excess hydrogen and the freed monohydroxy alcohol being separated and the alcohol being recycled to the transesterification stage. If the initial fatty materials contain glycerides of unsaturated fatty acids and it is desired to produce only saturated alcohols the hydrogenation must be effected in two stages at different temperatures and using different catalysts. For example, a mixture of zinc and copper chromite may be used at 300-360 DEG C. for the reduction of the esters and a nickel silicate catalyst at 180-250 DEG C. for the saturation of the double linkage. In the examples: (a) coconut oil and methanol are heated under pressure in the presence of a zinc silicate catalyst and the methyl esters are separated from glycerin; the esters are hydrogenated in the presence of a copper-zinc chromite catalyst to give higher fatty alcohols and methanol which is recycled to the transesterification stage; (b) tallow grease is treated as in (a) and the alcohols obtained are subjected to a second hydrogenation at a lower temperature in the presence of a nickel silicate catalyst to saturate the unsaturated alcohols present; and (c) the alcohols obtained by the treatment of coconut oil as in (a) are subjected to a second hydrogenation at a lower temperature in the presence of a nickel silicate catalyst to give saturated alcohols. ALSO: A copper/zinc chromite catalyst for use in the hydrogenation of ester groups is obtained by adding zinc oxide and chromic oxide successively to a mixture of cupric oxide, acetic acid and water; the mixture is heated until the solids are dissolved and powdered active carbon is added; the mixture is then evaporated to give the required catalyst. A nickel silicate catalyst for use in the saturation of olefinic linkages is obtained by treating a sodium silicate solution with caustic soda solution; a mixture of a solution of nickel nitrate in water and metallic nickel, partially neutralized with sodium carbonate, is added to the alkaline sodium silicate solution; nickel silicate is precipitated, filtered off and mixed with fibrous asbestos which has previously been washed with nitric acid; the resulting mixture is dried to give the desired catalyst. Zinc silicate is prepared by adding acetic acid to a suspension of zinc oxide in water at 70 DEG C., adding the zinc acetate solution formed to an aqueous solution of sodium silicate, separating and washing the precipitated zinc silicate and heating it first at 40-50 DEG C. and then at 130 DEG C.